BA WTR
WR CO
Mail Stop 60189

MAY 2 7 2009

Memorandum

To: Don Garrett, Regional Engineering Office

From: Civil Engineer, Division of Water Resources, Region 6 /s/ John Simpson

Subject: Review of Arapaho NWR Diversion Reconstruction

On May 5, 2009, Megan Estep, Ken Bottle, and John Simpson from the Regional Division of Water Resources inspected the Diversion Reconstruction Project with Pam Johnson from Arapaho National Wildlife Refuge. All four structures in the contract were visited: Hubbard #2; Oklahoma #1; Hill & Crowder; and Dryer. This memo summarized the issues we recommend to be addressed prior to the warranty expiration.

A summary of the issues and suggestions for each structure are shown below.

Oklahoma #1

Concerns

1. Structure may not divert water during low water periods.
2. Gate does not close tightly.

Recommendations

1. Move rock drop structure downstream and reconfigure it to function more efficiently.
2. Adjust gate to ensure complete closure.

Hubbard #2

Concerns

1. Gate does not close tightly.
2. Current forces fish into gate, traps fish, and kills fish.
3. Material used for rock drop structure does not appear to be 3 foot diameter.
4. Rock drop structure is built straight across the river, rather than V-shaped.
5. Structure may not divert sufficient water during low water periods.
6. Steel bar grating not designed to support load.

Recommendations

1. Adjust gate to ensure complete closure.
2. Change geometry of concrete weir and rock drop structure so that current is not directed at concrete weir.

3. Place larger diameter boulders downstream in rock drop structure.
4. Rock drop structure can be placed downstream of existing location, and with a more effective geometry.
5. Existing rock structure can remain, but may be submerged if new structure is built.
6. Replace steel bar grating with product designed to support loads.

Hill & Crowder

Concerns

1. Gate does not close tightly.

Recommendations

1. Adjust gate to ensure complete closure.

Dryer

Concerns

1. Erosion occurring at upstream and downstream wingwalls of concrete weir structure.
2. Rock drop structure built without the proper V-shape. Rock structure would perform better if built with sharper V-shape rather than straight across river.
3. Rock drop structure is located too close to concrete weir.

Recommendations

1. Armor upstream and downstream wingwalls of concrete to prevent erosion.
2. The stoplogs could be placed in the 2' wide sluice to try to keep water away from downstream wingwall, where erosion is occurring.
3. Construct sharper V-shape weir downstream from existing structure.

If you require additional information or have questions, please contact me at 303-236-4493.

Attachments

cc: Project Leader - Arapaho National Wildlife Refuge
Refuge Supervisor

bcc: WTR rf
Refuges